

What is claimed is:

1. A method of cementing in a subterranean formation comprising the steps of:
providing a cement composition comprising an unhydrated cement that comprises a high alumina cement, a silica source, and a soluble phosphate; and a set retarder comprising a water soluble carboxylic acid;
placing the cement composition into the subterranean formation;
permitting the cement composition to set therein.
2. The method of claim 1 wherein the high alumina cement has an alumina concentration in the range of from about 40% to about 80% of the weight of the high alumina cement.
3. The method of claim 1 wherein the high alumina cement is present in the cement composition in an amount in the range of from about 20% to about 80% of the weight of the unhydrated cement.
4. The method of claim 1 wherein the silica source comprises vitrified shale.
5. The method of claim 4 wherein the silica source further comprises fly ash.
6. The method of claim 1 wherein the silica source is present in the cement composition in an amount in the range of from about 20% to about 80% by the weight of the unhydrated cement.
7. The method of claim 1 wherein the soluble phosphate is present in the cement composition in an amount in the range of from about 1% to about 10% by the weight of the unhydrated cement.
8. The method of claim 1 wherein the soluble phosphate comprises sodium hexametaphosphate, sodium polyphosphate, vitreous sodium phosphate, or mixtures thereof.
9. The method of claim 1 wherein the set retarder comprising the water-soluble carboxylic acid is present in the cement composition in an amount in the range of from about 0.1% to about 5% by weight of the unhydrated cement.
10. The method of claim 1 wherein the cement composition further comprises a fluid loss control additive, a weighting agent, a defoamer, a surfactant, mica, fumed silica, a salt, a dispersant, a formation conditioning agent, an expanding additive, microspheres, or an accelerant.
11. The method of claim 1 wherein the cement composition further comprises water.

12. The method of claim 11 wherein the water is fresh water, salt water, brine, sea water, or a mixture thereof.

13. The method of claim 11 wherein the water is present in the cement composition in an amount sufficient to form a pumpable slurry.

14. The method in claim 11 wherein the water is present in the cement composition in an amount in the range of from about 30% to about 50% by the weight of the unhydrated cement.

15. The method of claim 1 wherein the cement composition has a density in the range of from about 6 pounds per gallon to about 23 pounds per gallon.

16. The method of claim 1 wherein the cement composition further comprises carbon fibers.

17. The method of claim 16 wherein the carbon fibers have a mean length of about 150 microns.

18. The method of claim 16 wherein the carbon fibers are present in the cement composition in an amount in the range of from about 1% to about 15% by weight of the unhydrated cement.

19. The method of claim 1 wherein the cement composition further comprises rubber particles.

20. The method of claim 19 wherein the rubber particles are present in the cement composition in an amount in the range of from about 10% to about 30% by weight of the unhydrated cement.

21. The method of claim 19 wherein the rubber particles have a mean length of less than about 1/4".

22. The method of claim 1 wherein the cement composition is a low-density cement composition.

23. The method of claim 1 wherein the high alumina cement has an alumina concentration in the range of from about 40% to about 80% of the weight of the high alumina cement; wherein the high alumina cement is present in the cement composition in an amount in the range of from about 20% to about 80% by weight of the unhydrated cement; wherein the silica source comprises vitrified shale; wherein the silica source is present in the cement composition in an amount in the range of from about 20% to about 80% by weight of the unhydrated cement; wherein the soluble phosphate is sodium hexametaphosphate present in the

cement composition in an amount in the range of from about 1% to about 10% by weight of the unhydrated cement; and wherein the set retarder is present in the cement composition in an amount in the range of from about 0.1% to about 5% by weight of the unhydrated cement.

24. A cement composition comprising:

an unhydrated cement comprising:

a high alumina cement,

a silica source, and

a soluble phosphate; and

a set retarder comprising a water soluble carboxylic acid.

25. The cement composition of claim 24 wherein the high alumina cement has an alumina concentration in the range of from about 40% to about 80% of the weight of the high alumina cement.

26. The cement composition of claim 24 wherein the high alumina cement is present in the cement composition in an amount in the range of from about 20% to about 80% by weight of the unhydrated cement.

27. The cement composition of claim 24 wherein the silica source is present in the cement composition in an amount sufficient to provide a desired level of corrosion resistance.

28. The cement composition of claim 24 wherein the silica source comprises vitrified shale.

29. The cement composition of claim 28 wherein the silica source further comprises fly ash.

30. The cement composition of claim 24 wherein the silica source is present in the cement composition in an amount in the range of from about 20% to about 80% by weight of the unhydrated cement.

31. The cement composition of claim 24 wherein the soluble phosphate is present in the cement composition in an amount sufficient to provide a desired level of corrosion resistance.

32. The cement composition of claim 24 wherein the soluble phosphate is present in the cement composition in an amount in the range of from about 1% to about 10% by weight of the unhydrated cement.

33. The cement composition of claim 24 wherein the soluble phosphate comprises sodium hexametaphosphate, sodium polyphosphate, vitreous sodium phosphate, or mixtures thereof.

34. The cement composition of claim 24 wherein the set retarder is present in the cement composition in an amount sufficient to prevent the cement from setting until a desired time after the cement has been placed in a subterranean formation.

35. The cement composition of claim 24 wherein the set retarder is present in the cement composition in an amount in the range of from about 0.1% to about 5% by weight of the unhydrated cement.

36. The cement composition of claim 24 further comprising a fluid loss control additive, a weighting agent, a defoamer, a surfactant, mica, fumed silica, a salt, a dispersant, a formation conditioning agent, an expanding additive, microspheres, or an accelerant.

37. The cement composition of claim 24 further comprising water in an amount sufficient to form a pumpable slurry.

38. The cement composition of claim 37 wherein the water is present in the cement composition in an amount in the range of from about 30% to about 50% by weight of the unhydrated cement.

39. The cement composition of claim 37 wherein the water is fresh water, salt water, brine, sea water, or a mixture thereof.

40. The cement composition of claim 24 wherein the cement composition further comprises carbon fibers, present in the cement composition in an amount sufficient to achieve a desired tensile strength for the set cement.

41. The cement composition of claim 40 wherein the carbon fibers have a mean length of 150 microns.

42. The cement composition of claim 40 wherein the carbon fibers are present in the cement composition in an amount in the range of from about 1% to about 15% by weight of the unhydrated cement.

43. The cement composition of claim 24 wherein the cement composition further comprises inert ground rubber particles, present in an amount sufficient to achieve a desired degree of ductility for the set cement.

44. The cement composition of claim 43 wherein the rubber particles have a mean length of less than about 1/4".

45. The cement composition of claim 43 wherein the rubber particles are present in the cement composition in an amount in the range of from about 10% to about 30% by weight of the unhydrated cement.

46. The cement composition of claim 24 wherein the density of the cement composition is in the range of from about 6 to about 23 pounds per gallon.

47. The cement composition of claim 24 wherein the cement composition is a low-density cement composition.

48. The cement composition of claim 24 wherein the high alumina cement has an alumina concentration in the range of from about 40% to about 80% of the weight of the high alumina cement; wherein the high alumina cement is present in the cement composition in an amount in the range of from about 20% to about 80% by weight of the unhydrated cement; wherein the silica source comprises vitrified shale; wherein the silica source is present in the cement composition in an amount in the range of from about 20% to about 80% by weight of the unhydrated cement; wherein the soluble phosphate is sodium hexametaphosphate present in the cement composition in an amount in the range of from about 1% to about 10% by weight of the unhydrated cement; and wherein the set retarder is present in an amount in the range of from about 0.1% to about 5% by weight of the unhydrated cement.